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EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 11/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/052,921	LI ET AL.	
	Examiner	Art Unit	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. In view of the newly filed Declaration deleting any reference to a priority document, the examiner has withdrawn the previous priority rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 26, 27 and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horrocks in view of either the applicant's admitted prior art or Wipf et al (J. Electrochem. Soc., 1991, 138, pp. 469-474). Wipf is being cited and relied on for the first time with this office action.

4. Horrocks discloses a scanning electrochemical potential microscope that comprises a sample support (a gold microdisc) that accommodates a sample of urease in a polar solution of water. Horrocks discloses a probe having a tip including a distal end disposed a perpendicular distance from the surface and a potential measuring device electrically coupled to the tip that measures a potential. See fig. 1 and Introduction. With respect to the formation of a potential gradient, it is only necessary for the structure of Horrocks to be capable of supporting a potential gradient, which the structure of Horrocks would clearly be capable of doing. In addition, it

appears that fig. 2 and 3 evidence that a potential gradient has been established between the sample and the tip. With respect to the now specified tip-sample spacing, Horrocks teaches that the tip-sample spacing can be as low as 4.8 μm (fig. 3 shows d/r approaching 1.9 which would be a d of 4.8 μm when r is 2.5 μm). It is unclear if that spacing is sufficient enough to anticipate the spacing of claim 26. Applicant states in the arguments of 9-28-2005 that the diffusion layer is typically "microns high" with the electrical double layer presumably being submicron and the examiner will presume to the applicant's favor that the 4.8 μm of Horrocks would not meet the recited "in the electrical double layer". However, applicant urged that conventional SECM (i.e. the technique of Horrocks) can take measurements with tip-sample spacings as little as 1 nm. See page 4, lines 3-5. Hence, conventional Z-actuating means for SECM permitted spacings on the order of a nanometer. Furthermore, Horrocks relied on the prior art SECM structure for determining tip-sample spacings (see referral to reference 14 halfway down col. 1 of p. 1116). This reference 14 is Wipf and it teaches the use of tip-sample spacing as low as 0.5 μm as part of its procedure (see the discussion of "submicron" actuators on p. 470, col. 1 and p. 472, col. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize conventional actuators that would permit spacings meeting the claim language for the microscope of Horrocks both because Horrocks explicitly suggested we use appropriate prior art actuators (Wipf) and because the substitution of one known actuator for another known actuator (admitted prior art) requires only routine skill in the art. Moreover, any actuator that provides positional control down to 1 nm or even submicron would clearly provide very accurate control of the position at larger distances as well. It should be noted that the examiner is not urging that it would have been obvious to one of ordinary skill in the art for Horrocks to perform

its measurements at tip-sample spacings of around 1 nm. Rather the rejection is based on the fact that it would have been obvious to one of ordinary skill in the art for Horrocks to rely on conventional actuators in the art that would have provided distances that meet this claim interpretation.

5. With respect to the scanning actuator, fig. 3 demonstrates the presence of control of the relative movement between probe and sample, which would read on "scanning actuator" and "Z-actuator" giving the claim language its broadest reasonable interpretation (however, see the discussion of tuning below).

6. With respect to the structure drawn to the use of tuning, see the discussion of the bi-potentiostat on p. 1116. Whether or not the bi-potentiostat is utilized for the specified tuning or feedback functions is the intended use of the bi-potentiostat and the intended use need not be given further due consideration in determining patentability.

7. With respect to how the Z-actuator translates Z-position of the tip, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. Applicant's "spectroscopic mode" appears to refer not to any spectroscopic structure per se, but rather a particular mode of operation. See p. 26, ll. 8-15. Absent a particular definition of what structure is necessary for operation in a "spectroscopic mode", this claim does not further define the Z-actuator of Horrocks.

8. With respect to the claimed "tuning device", because Horrocks teaches applying and varying the potential on the sample surface (see caption on fig. 4 and p. 1116, col. 1, ll. 18-25), it meet the defined tuning device giving the claim language its broadest reasonable interpretation.

9. With respect to claim 36, the ionic solution of Horrocks is clearly has a "selected ionic concentration" because they specified a particular concentration of buffer solution (p. 1116, col. 1).

10. Claims 28-30 and 37-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horrocks (or Horrocks in view of either the admitted prior art or Wipf) in further view of Kwak et al (USP 5,202,004).

11. With respect to claim 28, Horrocks (or Horrocks in view of admitted prior art and Wipf) set forth all the limitations of the claim, but did not explicitly recite the presence of a piezoelectric actuator. Kwak discloses in an alternate scanning electrochemical microscope the use of a piezoelectric actuator for the control of the z-directions. The piezoelectric element allows for angstrom level control of motion. See col. 2, line 59 through col. 3, line 15. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Kwak for the microscope of Horrocks (with or without the further teaching of the admitted prior art or Wipf) in order to provide angstrom level control of the scanning tip motion.

12. With respect to claims 29, 30 and 37 (those limitations not covered previously), Horrock set forth all the limitations of the claim, but did not explicitly recite the presence of a feedback circuit to control tip-sample separation in response to a change in potential. However, it is conventional in the SECM art to utilize feedback control of the tip-sample separation. In particular, Kwak teaches a number of modes for operating a SECM including a mode where the measured signal is relied on to control the tip-sample separation such that the contours of the sample surface can be monitored and followed. See col. 6, lines 9-54. It would have been

obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Kwak for the microscope of Horrocks so that the tip-sample separation can be accurately controlled.

13. With to claims 38-40 and 42, see the previous discussion of Horrocks (both in this office action and in previous office actions).

14. With respect to claim 41, modifying ionic concentration is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. Moreover, claim 41 only states that the ionic concentration "can be modified" and this claim is thereby non-committal.

Response to Amendment and Arguments

15. In view of the applicant's amendment to claim 26, the examiner has withdrawn the 102 rejection over the teaching of Horrocks and will construe the amended claim language to require that the probe tip must be capable of being placed a perpendicular distance from the surface in the electrical double layer.

16. Applicant's arguments filed 9-28-2005 have been fully considered but they are not persuasive. Applicant's arguments concerning the 102 rejection of Horrocks are moot because that rejection have been withdrawn. With respect to the examiner's previous alternative rejection (now the main rejection for this office action), applicant urged that prior art tip-sample separation of 1 nm was only "theoretically possible". Here, the examiner believes the applicant is referring to performing *measurements* with tip-sample separations of 1 nm. However, the examiner's alternative rejection is not that the it would have been obvious to one of ordinary skill

in the art to *perform the measurement* of Horrocks with a tip-sample separation on the order of the electrical double layer, but rather that it would have been obvious to provide Horrocks with a tip actuator that would have provided said tip-sample spacing. In other words, if the prior art taught a potential measuring device coupled to the tip (as Horrocks does) and if the prior art would have been able to actuate the tip such that it was mere submicron distance away from the sample (as the admitted prior art evidences was capable), then it meets the structural "probe" and "potential measuring device" limitations of claim 26. Again, the examiner draws the applicant's attention to MPEP 2114, which states that the prior art need only meet all the *structural* limitations of the claims and need not teach what that structure is being utilized for.

17. Applicant also urges that if Horrocks were brought any closer than 2.5 μm, it would have a high probability of crashing into the sample surface. First, the examiner doesn't see how this would be the case. Tip diameter just concerns how wide the electrode is and it is unclear why a wider electrode would be in any more danger of crashing into the sample surface than a smaller electrode. In fact, the new teaching of Wipf would appear to contradict the applicant. In particular, Wipf discloses the use of an electrode much wider than that of Horrocks (10 μm wire with a 10-20 times that width in insulator material (see "Experimental" on col. 1 of p. 470)) is being placed within 0.5 μm of the sample surface (p. 472, col. 1). If an electrode with a 100-200 μm radius can be placed within 0.5 μm of the sample surface, then surely Horrocks would similarly be capable of 0.5 μm and less. The examiner might appreciate that sample tip radii would affect other issues such as resolution and signal to noise (however, that is not what the applicant is alleging), but it is unclear how it affects the tip-sample spacing. Second, stating that something has a "high probability" of failure doesn't necessarily lead one away from performing

a particular experiments. Many experiments have a high degree of failure and they are still performed. It is also noted that applicant's argument is not quantified in any manner. How "high" is this probability? Is it high enough to discourage any attempt to do so? Applicant doesn't say. Third, applicant isn't claiming anything about the electrode radius so it is unclear how this points to any structural differentiation of Horrock in view of the admitted prior art over the claimed invention.

18. Applicant also urges that measuring a potential gradient as the electrical double layer is not merely a statement of intended use. The examiner disagrees. Measuring a potential gradient at the electrical double layer is clearly what the applicant intends to do with the claimed apparatus. Again claim 26 is drawn to structure and applicant must define the instant invention structure in a manner that reads free of the prior art structure. How one utilizes that defined structure is not a structural distinction over the prior art structure.

19. With respect to the rejection of Horrocks in view of Kwak, applicant urges that Kwak teaches using a bi-potentiostat to maintain a constant current/voltage in the working tip to measure a surface contour. However, applicant contends that this is not feeding back on a measured voltage. The examiner does not follow this argument. If Kwak is teaching that a constant voltage is being maintained, doesn't that mean that Kwak is *measuring* this voltage? How does one maintain a constant voltage if one does not monitor or measure that voltage? In addition, because Horrocks operates on the principal of measured voltage, would any attempt of Horrocks to rely on its measurement to maintain a particular tip-sample distance require it to feedback off of its measured potential?

20. Applicant further urges that Kwak does disclose that the working tip can be maintained relative to the sample, but urges that this is only for conductive or semiconductive samples. First, it is unclear the relevance of this discussion when the claim makes no recitation of where the potential is being measured relative to. Claim 37 only states that the potential is being measured via the tip. Second, because the substrate of Horrocks is conductive (i.e. it is a gold disc), then this caveat of Kwak has no relevance to the rejection as stated.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 5:30 A.M. to 3:00 P.M. and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
November 14, 2005

KAJ K. OLSEN
PRIMARY EXAMINER